3rd NATIONAL ICTs in BASIC EDUCATION CONGRESS

Authentic technology-supported learning activities

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Any sufficiently advanced technology is indistinguishable from magic

Arthur C Clarke

John Sculley

Chief Executive of Apple Computer in 1988

"Teachers and students will command a rich learning environment that, had you described it to me when I was at school, would have seemed entirely magical …

John Sculley

Chief Executive of Apple Computer in 1988

… Imagine a screen that can display in vivid colour the inner workings of a cell, the births and deaths of stars, the clashes of armies, and the triumphs of art.

John Sculley

Chief Executive of Apple Computer in 1988

… And then imagine that you have access to all of this and more by exerting little more effort than simply asking for it to appear.

It seems like magic, even today!”

Not just magic!

Reflects a pedagogical view of learning **from** computers

Learning WITH technology

We can use pedagogical models (such as authentic learning) to guide the creation of successful learning environments

Authentic learning

What is it?

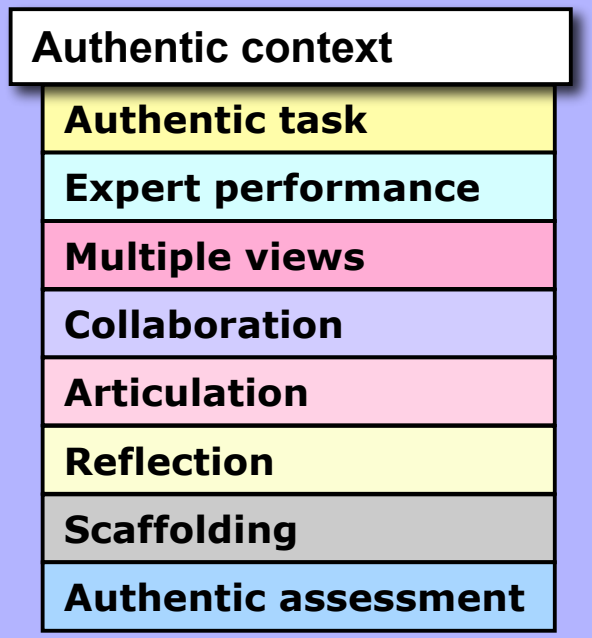
What is it not?

9 elements of authentic learning

(Herrington & Oliver, 2000)

- Authentic context
- Authentic activity
- Expert performances
- Multiple perspectives
- Collaboration
- Reflection
- Articulation
- Coaching and scaffolding
- Authentic assessment

Authentic context



A physical or virtual environment that reflects the way the knowledge will be used in real-life

Authentic context

- The context needs to provide the purpose and motivation for learning
- Ideas can be explored at length
- A design to preserve the complexity of the real-life setting
- Not sufficient to simply provide suitable examples from real-world situations to illustrate the concept or issue being taught

Authentic context

Technology tool

Web resources (and excursion)

Target students

Year 10

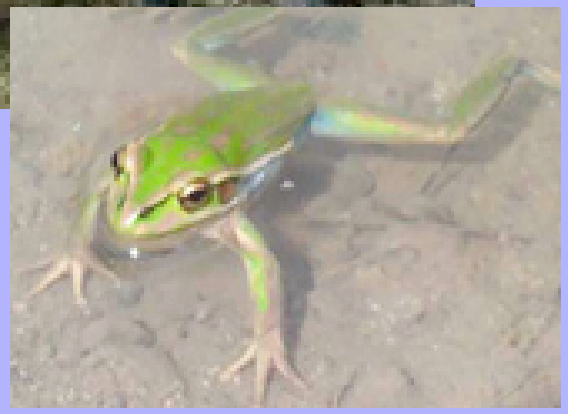
Subject area

Geography: Research action plan

Sydney Olympic Park

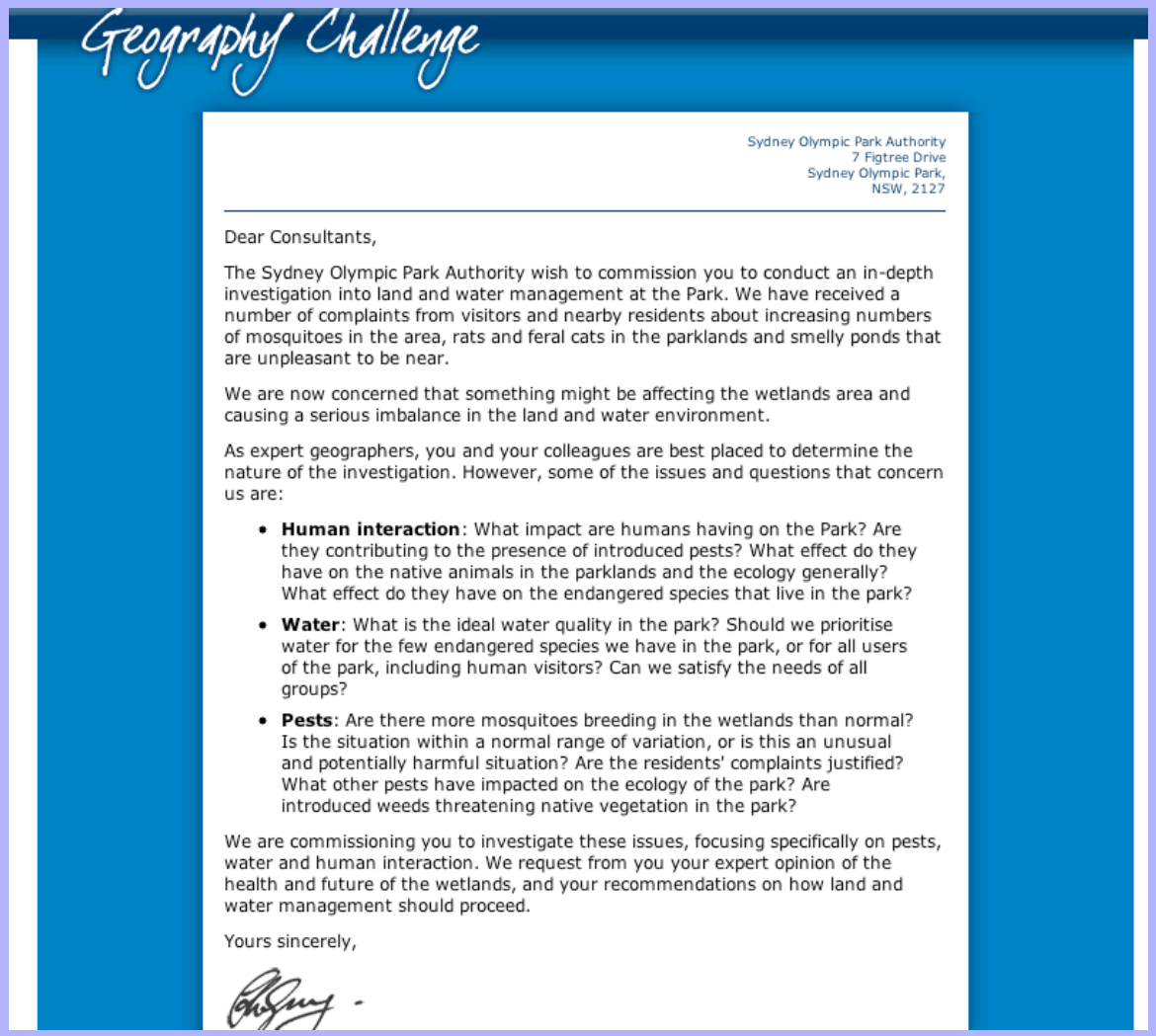
- Best known as site of 2000 Olympics
- Sporting venue

Biodiversity and resource conservation



- Endangered species
- Sustainability
- Conservation of energy

Context for data collection



Geography Challenge

Sydney Olympic Park Authority
7 Figtree Drive
Sydney Olympic Park,
NSW, 2127

Dear Consultants,

The Sydney Olympic Park Authority wish to commission you to conduct an in-depth investigation into land and water management at the Park. We have received a number of complaints from visitors and nearby residents about increasing numbers of mosquitoes in the area, rats and feral cats in the parklands and smelly ponds that are unpleasant to be near.

We are now concerned that something might be affecting the wetlands area and causing a serious imbalance in the land and water environment.

As expert geographers, you and your colleagues are best placed to determine the nature of the investigation. However, some of the issues and questions that concern us are:

- **Human interaction**: What impact are humans having on the Park? Are they contributing to the presence of introduced pests? What effect do they have on the native animals in the parklands and the ecology generally? What effect do they have on the endangered species that live in the park?
- **Water**: What is the ideal water quality in the park? Should we prioritise water for the few endangered species we have in the park, or for all users of the park, including human visitors? Can we satisfy the needs of all groups?
- **Pests**: Are there more mosquitoes breeding in the wetlands than normal? Is the situation within a normal range of variation, or is this an unusual and potentially harmful situation? Are the residents' complaints justified? What other pests have impacted on the ecology of the park? Are introduced weeds threatening native vegetation in the park?

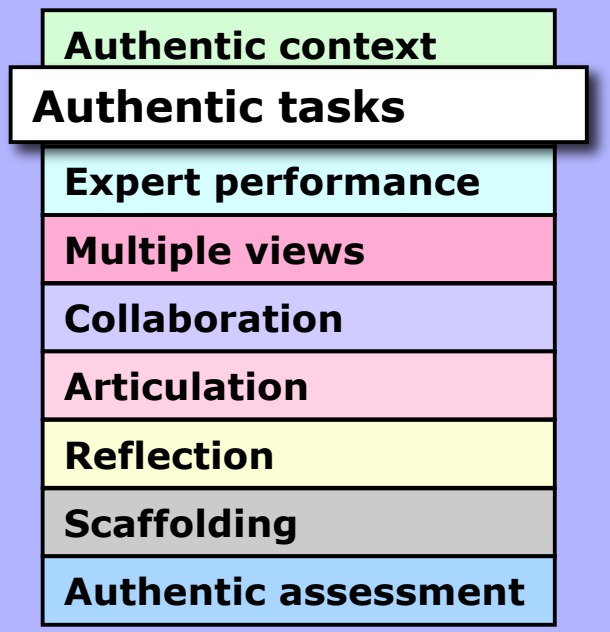
We are commissioning you to investigate these issues, focusing specifically on pests, water and human interaction. We request from you your expert opinion of the health and future of the wetlands, and your recommendations on how land and water management should proceed.

Yours sincerely,

Setting the context

Animation

Authentic tasks



Tasks and activities that have real-world relevance

Authentic tasks

- Design activities that have clear goals and real-world relevance
- Activities which require production of knowledge rather than reproduction
- Activities which are complex and ill-defined
- Completed over a longer period

Authentic tasks

Technology tool

Online discussion forums/email

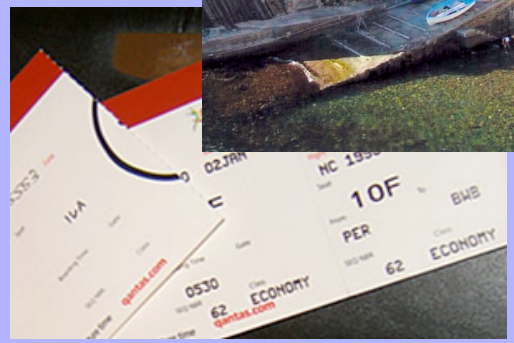
Target students

Upper high school

Subject area

Italian language

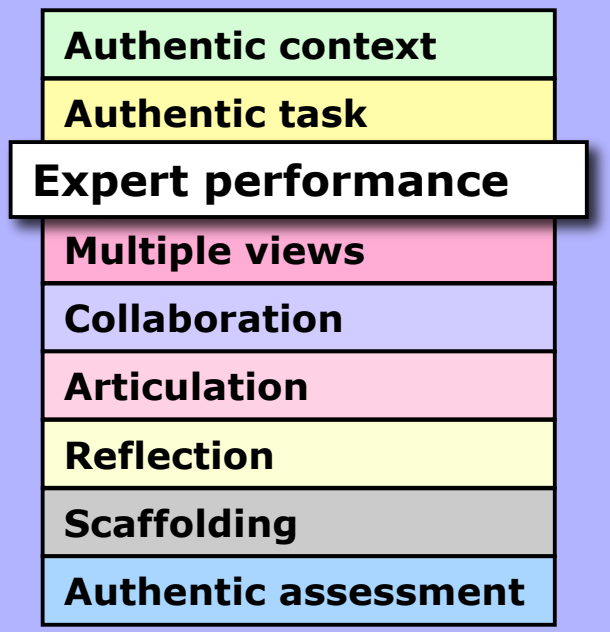
Authentic tasks



Plan a 5 day trip to Italy

- Students use discussion forums to converse in Italian with students in a school in Italy
- Enquire about:
  - sights to see,
  - food,
  - transport,
  - currency,
  - customs and lifestyle
- Create itinerary

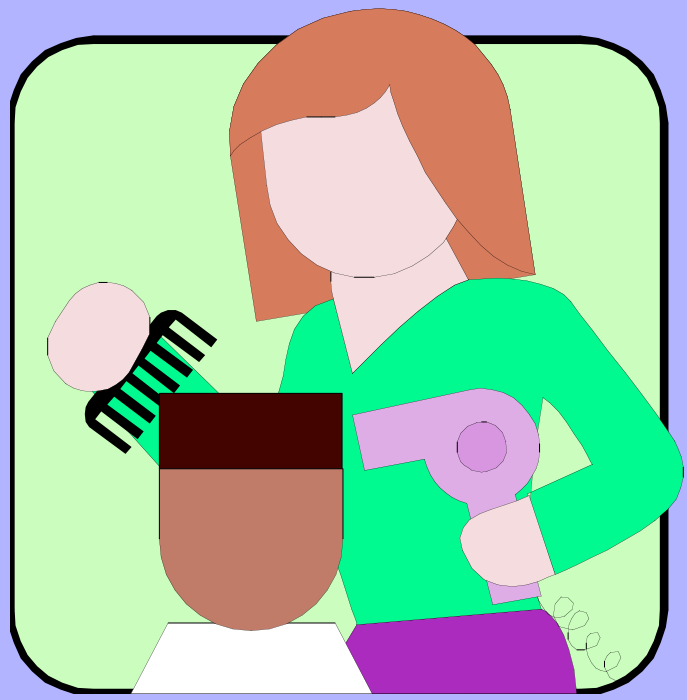
Expert performance



Access to expert thinking and the modelling of processes

Expert performances

- Access to the way an expert would think and act
- Access to learners in various levels of expertise
- Opportunities for the sharing of narratives and stories



Expert performance

Technology tool

Podcasts and vodcasts

Target students

Upper high school

Subject area

Business studies

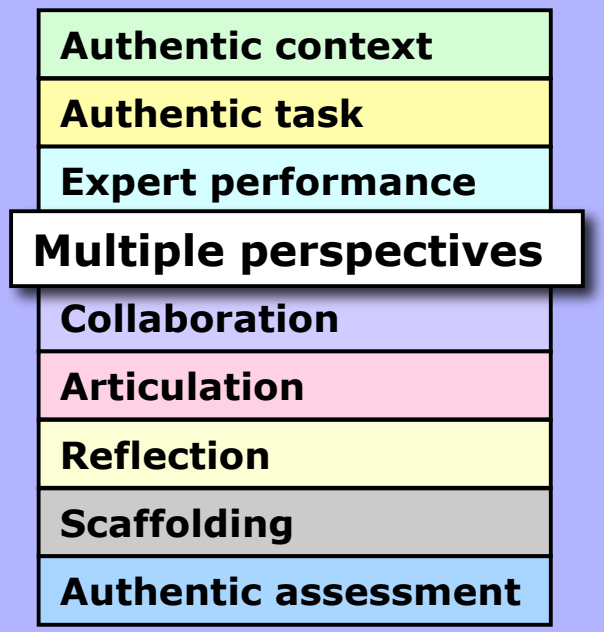
Expert performance

Business managers and leaders as guest speakers (e.g., time management)

Talks can be recorded and podcast

Follow up discussion on forum

Multiple perspectives



Different perspectives from different points of view

Multiple perspectives

- Not just a single perspective - such as a textbook
- Sufficiently rich learning environment to sustain repeated examination
- Different points of view

Multiple perspectives

Technology tool

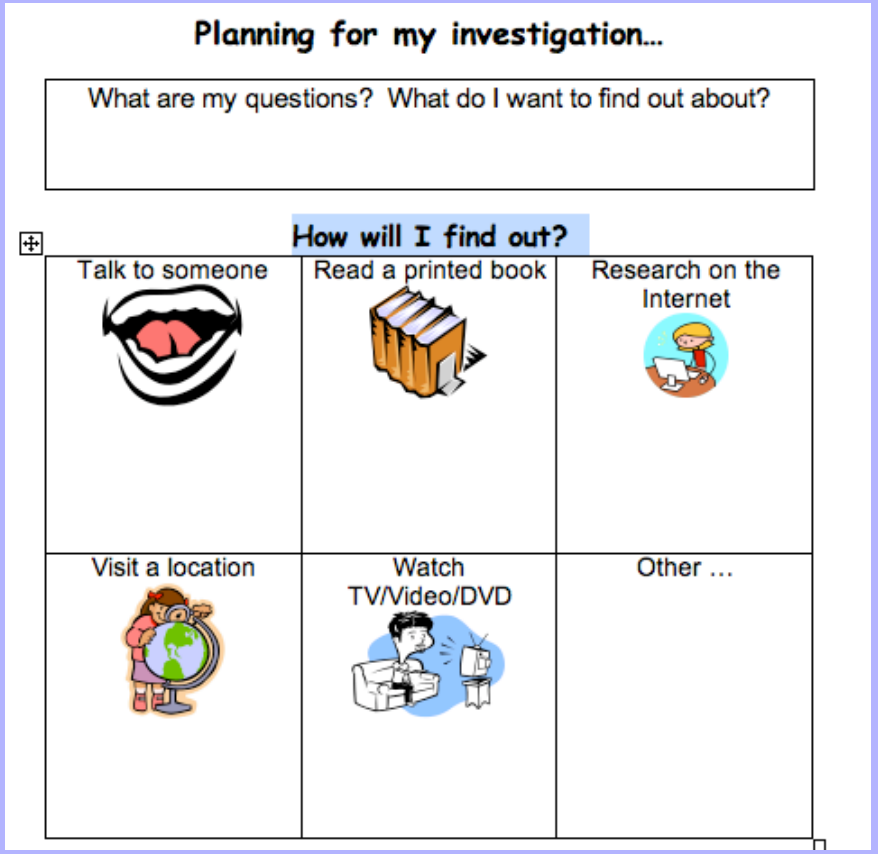
Digital libraries

Target students

Upper elementary

Subject area

Science: The planets



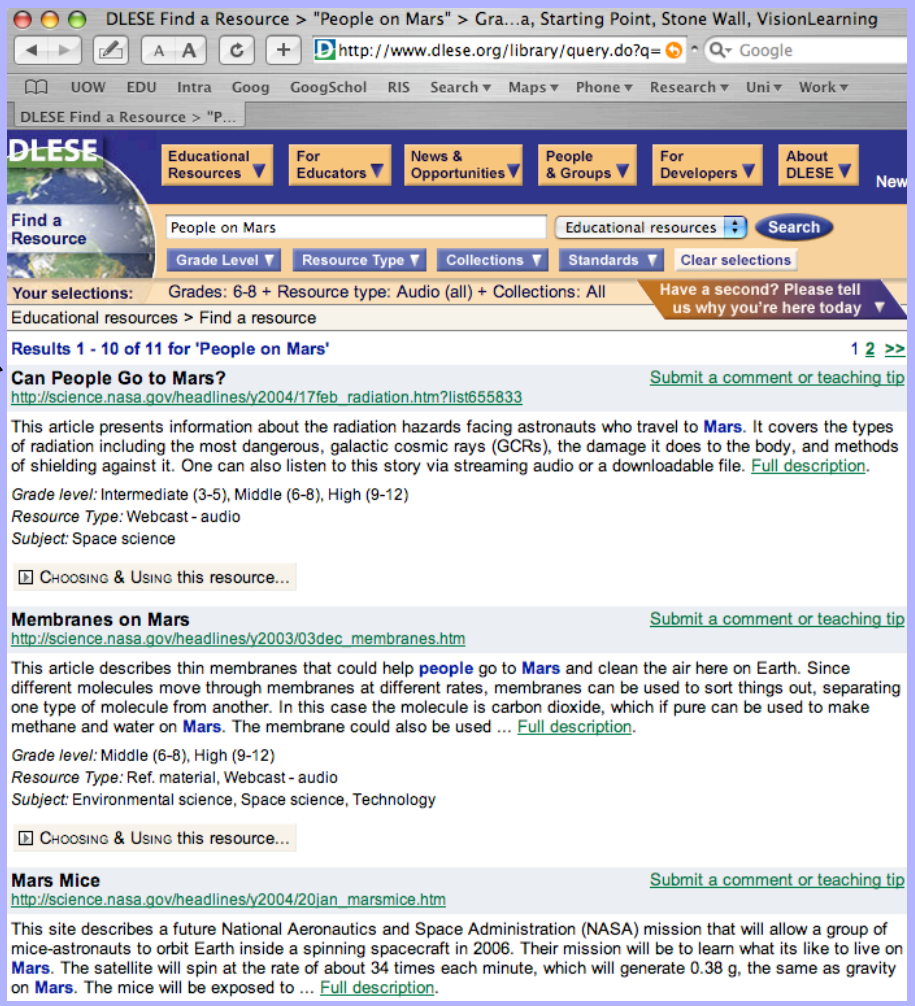
Multiple perspectives

Could humans live on Mars?

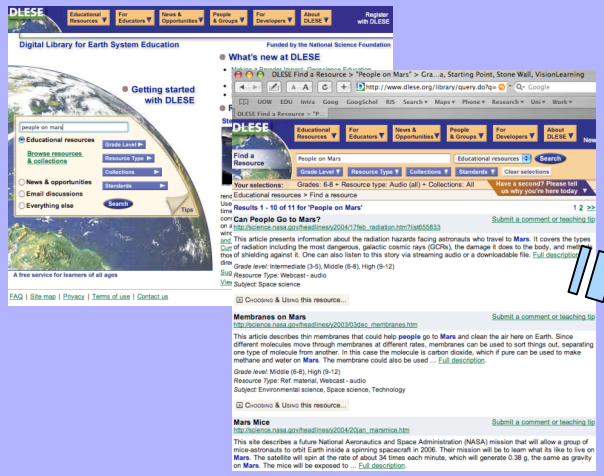
Digital libraries provide collections of hundreds of valuable online resources

More useful for education than a simple Google search

Multiple perspectives



Multiple perspectives



Digital library: Story

Can People Go to Mars?

Science @NASA
NASA explores. Humanity benefits.
science.nasa.gov

Space radiation between Earth and Mars poses a hazard to astronauts. How dangerous is it out there? NASA scientists are working to find out.

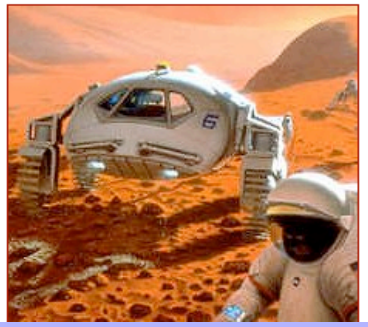
Listen to this story via streaming audio, a downloadable file, or get help.

February 17, 2004: NASA has a mystery to solve: Can people go to Mars, or not?

"It's a question of radiation," says Frank Cucinotta of NASA's Space Radiation Health Project at the Johnson Space Center. "We know how much radiation is out there, waiting for us between Earth and Mars, but we're not sure how the human body is going to react to it."

NASA astronauts have been in space, off and on, for 45 years. Except for a few quick trips to the moon, though, they've never spent much time far from Earth. Deep space is filled with protons from solar flares, gamma rays from newborn black holes, and cosmic rays from exploding stars. A long voyage to Mars, with no big planet nearby to block or deflect that radiation, is going to be a new adventure.

Right: "Distant Shores." NASA artwork by Pat Rawlings/SAIC. [Larger image]

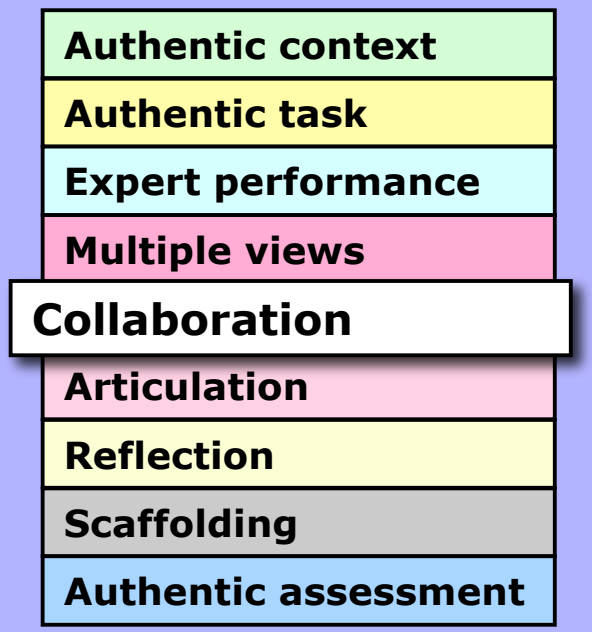


NASA weighs radiation danger in units of cancer risk. A healthy 40-year-old non-smoking American male stands a (whopping) 20% chance of eventually dying from cancer. That's if he stays on Earth. If he travels to Mars, the risk goes up.

The question is, how much?

"We're not sure," says Cucinotta. According to a 2001 study of people exposed to large doses of

Collaboration



Joint problem solving and social support

Collaboration

- Teams or pairs rather than individuals
- Collaboration encouraged through technology (discussion, chats, debates, wikis)
- Tasks addressed to groups, not individuals

Collaboration

Technology tool

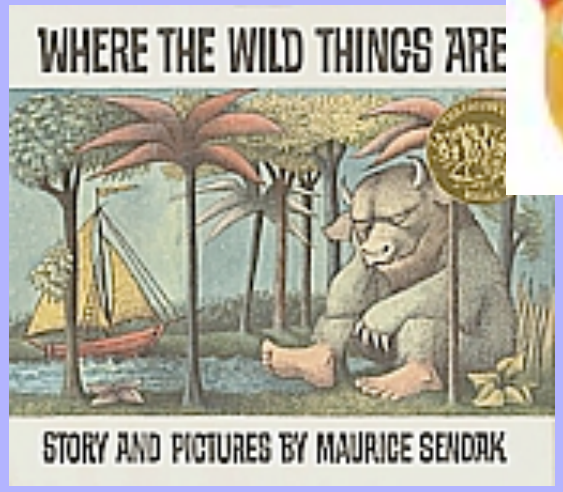
Presentation software, podcasts

Target students

Upper elementary

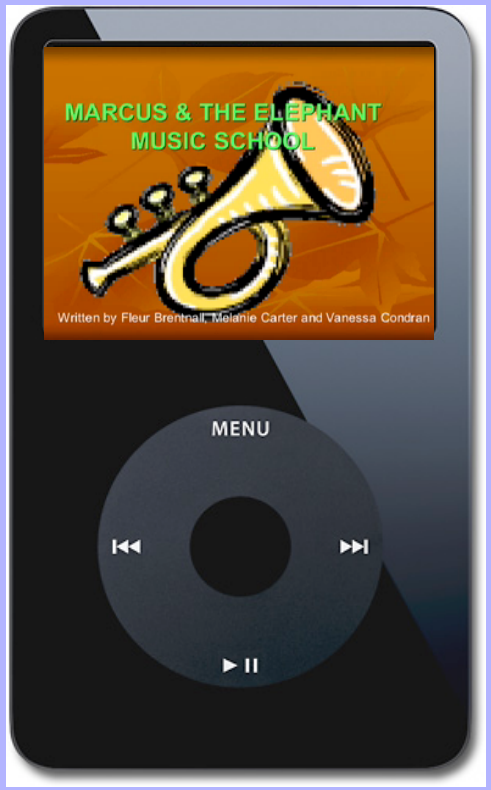
Subject area

Writing

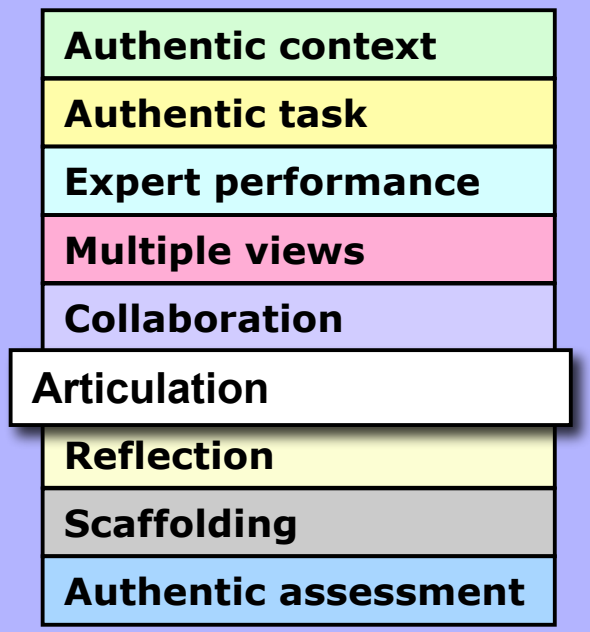


Create a talking book

- Students work in pairs or small groups
- Create a story for younger students
- Take photographs, draw and scan pictures to illustrate their book, create animations,
- Record audio for the story voiceover



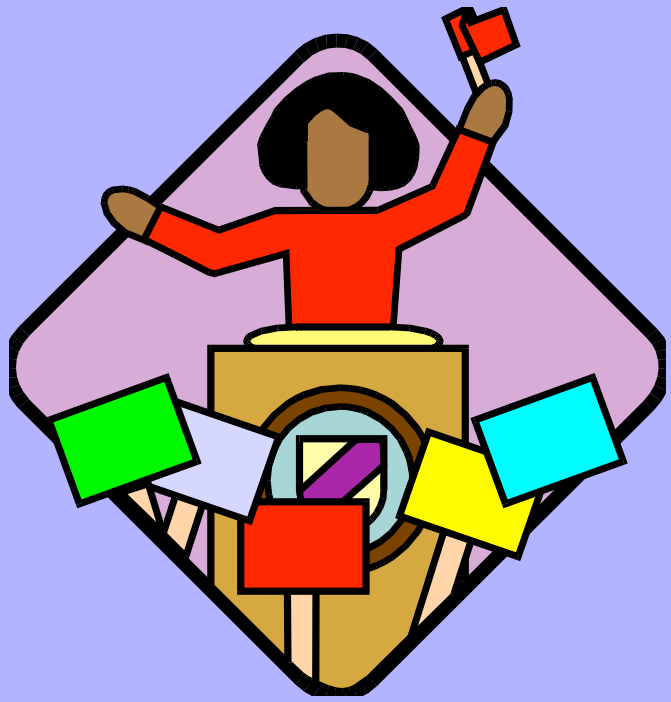
Articulation



Opportunities for students to speak about their growing understanding

Articulation

- Problems that need to be discussed
- Presentations to class
- Public presentation of argument to enable defence of position and ideas



Articulation

Technology tool

Digital video camera and iMovie

Target students

Lower high school

Subject area

Science/

Geography

The role of articulation

- ‘Thought undergoes many changes as it turns into speech. It does not merely find expression in speech; it finds reality and form’ (Vygotsky)

Articulation

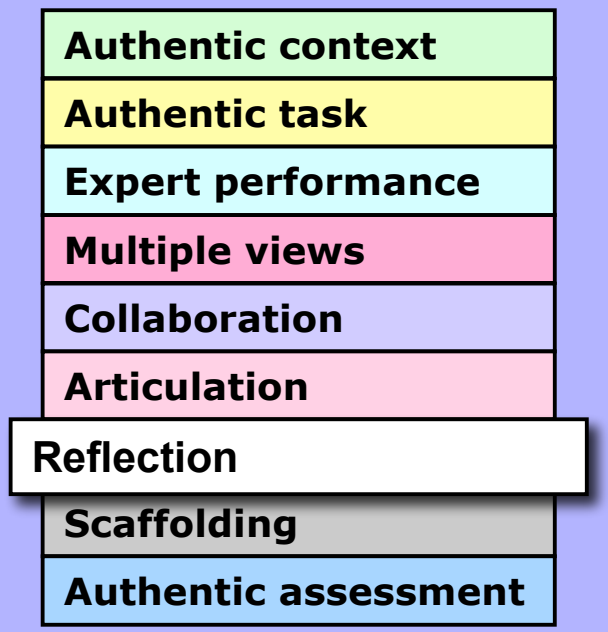
- What causes the phases of the moon?
- What causes the seasons?
- What is evaporation?
- How do you read a weather map?

Students create a film to teach other students a scientific concept, including:

- Diagrams
- Interviews
- Music,
- Animations etc.

In order to explain it to others they must understand it and be able to articulate the concepts

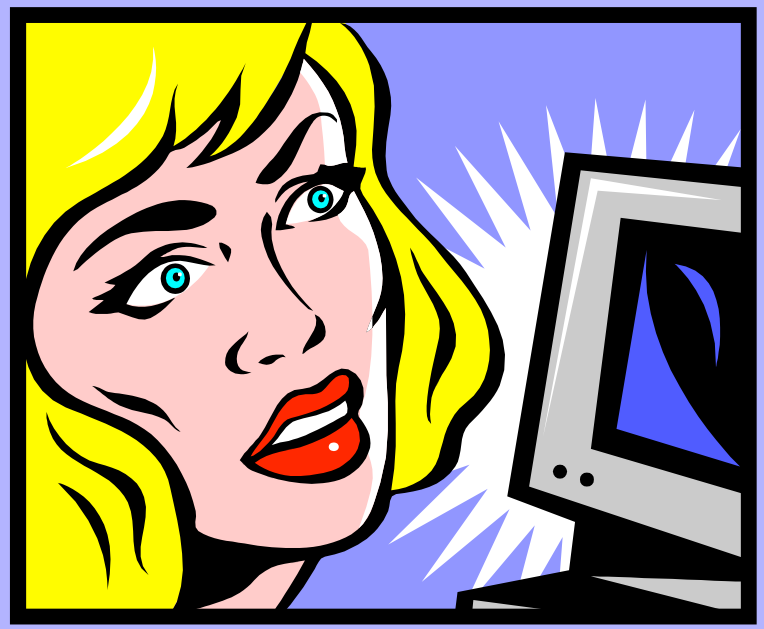
Reflection



Opportunity to think about, reflect and make choices

Reflection *in* action

- The facility for students to move around their learning environment and to act upon reflection
- Not quiet and solitary - can be a two-way process
- Non-linear organisation of learning environment
- Opportunities to make choices



Reflection *on* action

Technology tool

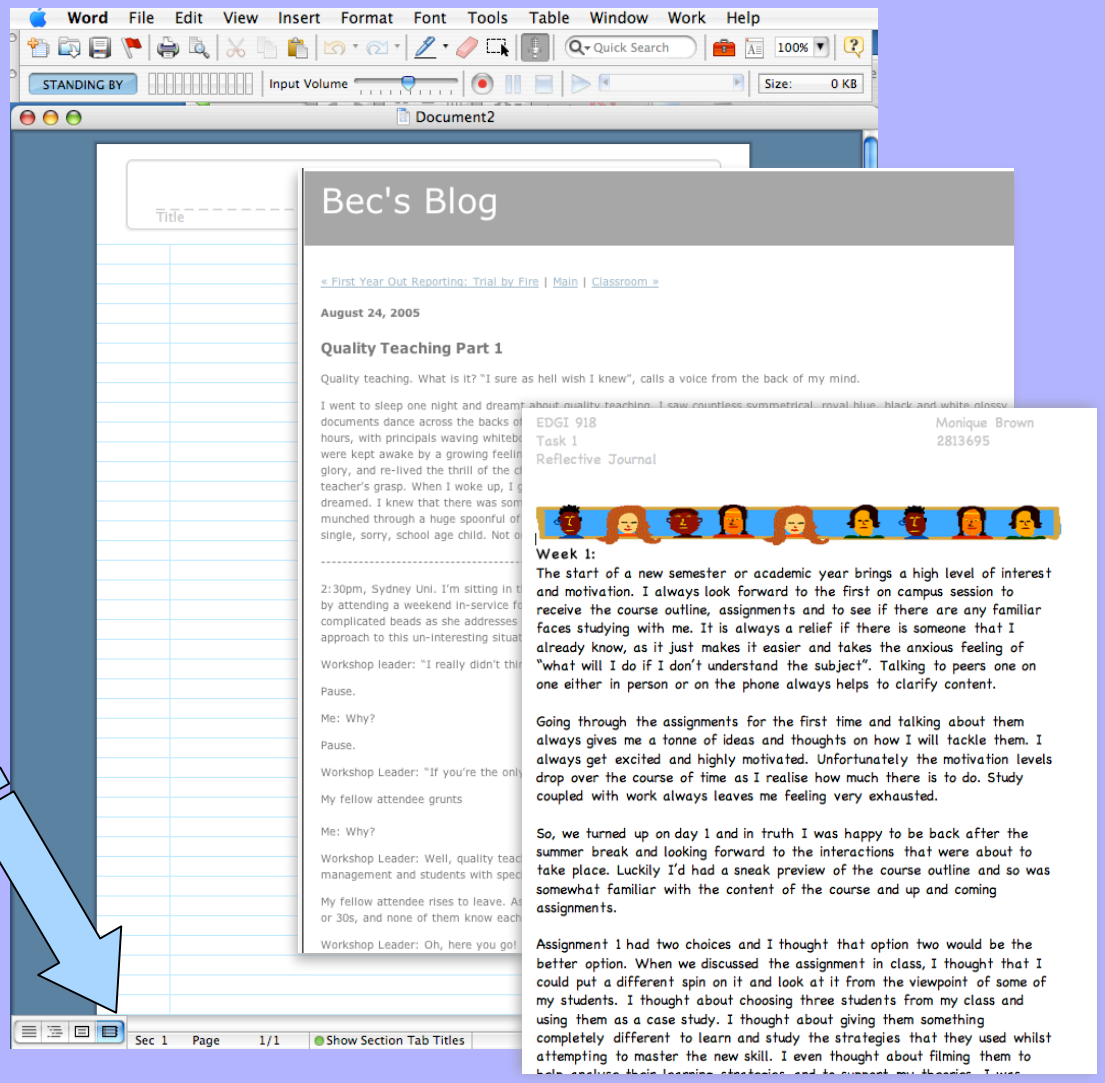
Blog site or word processing

Target students

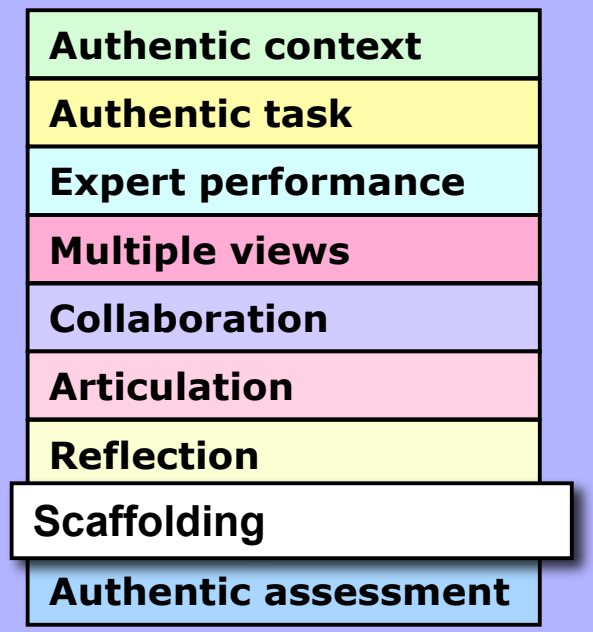
All

Subject area

Multi-disciplinary



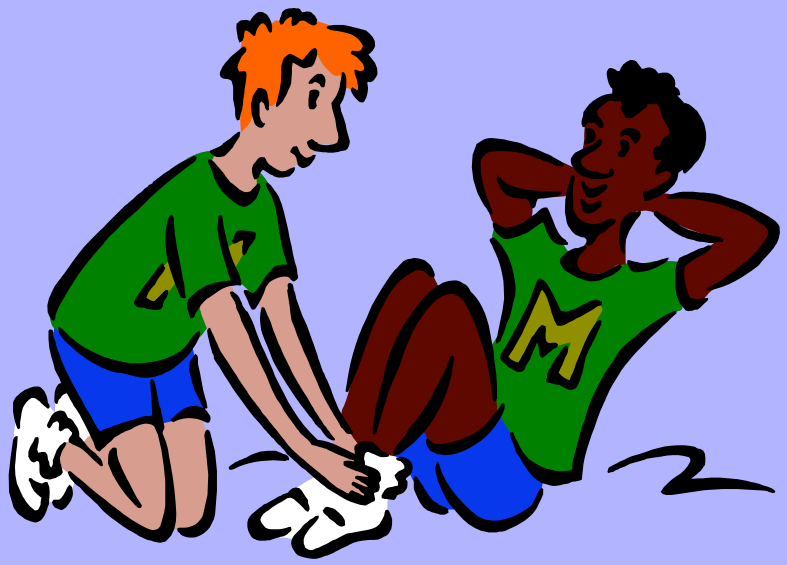
Scaffolding and coaching



Support provided to the learner by the teacher and others in the learning environment

Coaching and scaffolding

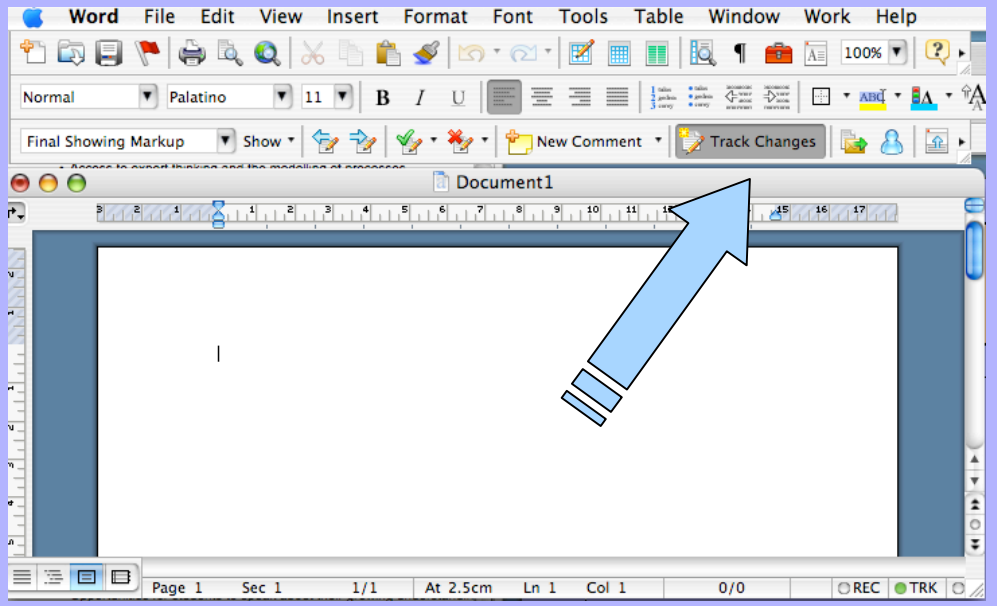
- No attempt to ‘transmit’ knowledge
- Teacher’s role is supporting rather than didactic
- Collaboration where more able partners can assist



Scaffolding

Technology tool

Tracking mode in Microsoft Word



Target students

Lower elementary

Subject area

Writing

Scaffolding

our fun day

~~when~~ yesterday we went to the pool. First we walked frofm our school to the pool. next we changed into our swimmers and had a swim. after that we had some lunsh and had aanother swim. finaly we got changed into our school clothes a walked backe to school. Then we whent home. it was a vere good day.

Student writing sample

Scaffolding

Dear Casey,
Thankyou for sharing your writing with me. I have made some suggestions for you to think about.

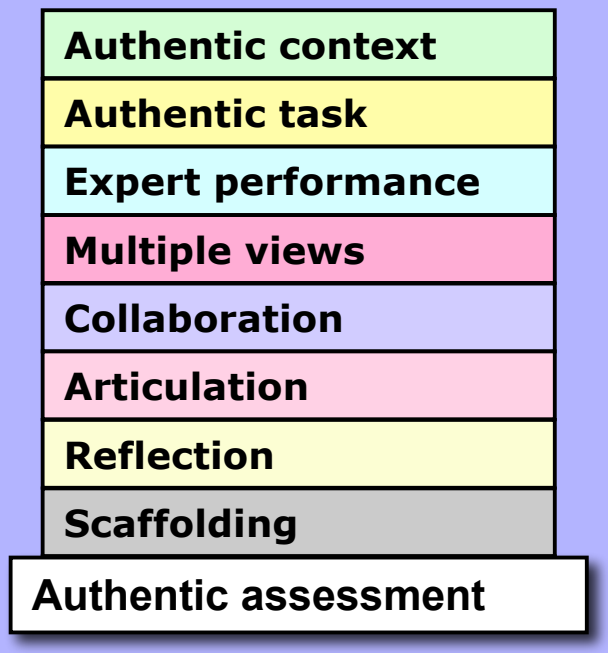
our fun day
This is a great title! Usually when we write a title we put a capital letter at the beginning of each word to tell the reader it is different from the rest of the text.

It is great to see that you have been proofreading your writing already! ~~when~~ yesterday we went to the pool. First we walked frofm our school to the pool. Remember to always begin a new sentence with a capital letter. Check all your sentences now. next we changed into our swimmers and had a swim. after that we had some lunsh When you get a red line under your writing that means that the word isn't spelt correctly. Have a good look at lunsh and think about the spelling pattern at the end (hint: it's like 'crunch') and had aanother swim. finaly we got changed into our school clothes a walked backe Listen

Tracked document

Teacher feedback/ support using tracking mode

Authentic assessment



Assessment is integrated with the task rather than separate testing

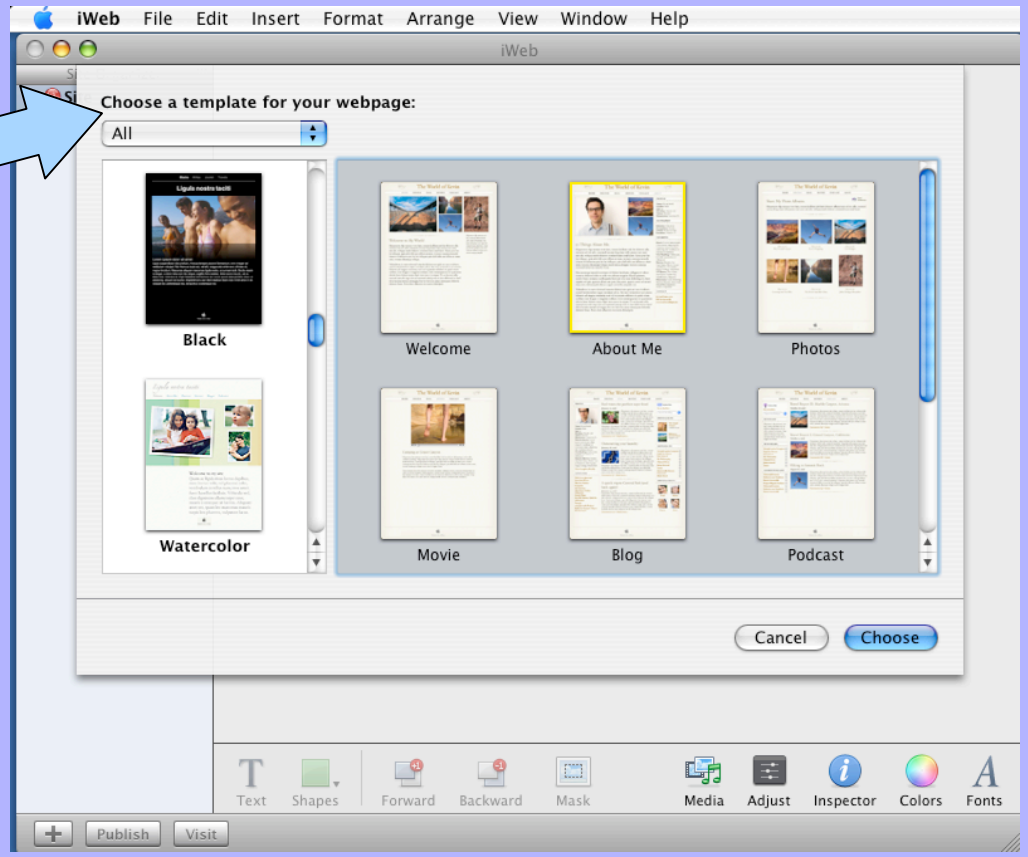
Authentic assessment

- Seamless integration of assessment and task
- Opportunities to enable students to craft polished performances
- Significant student time and effort in collaboration with others

Authentic assessment

Technology tool

Online portfolio



Target students

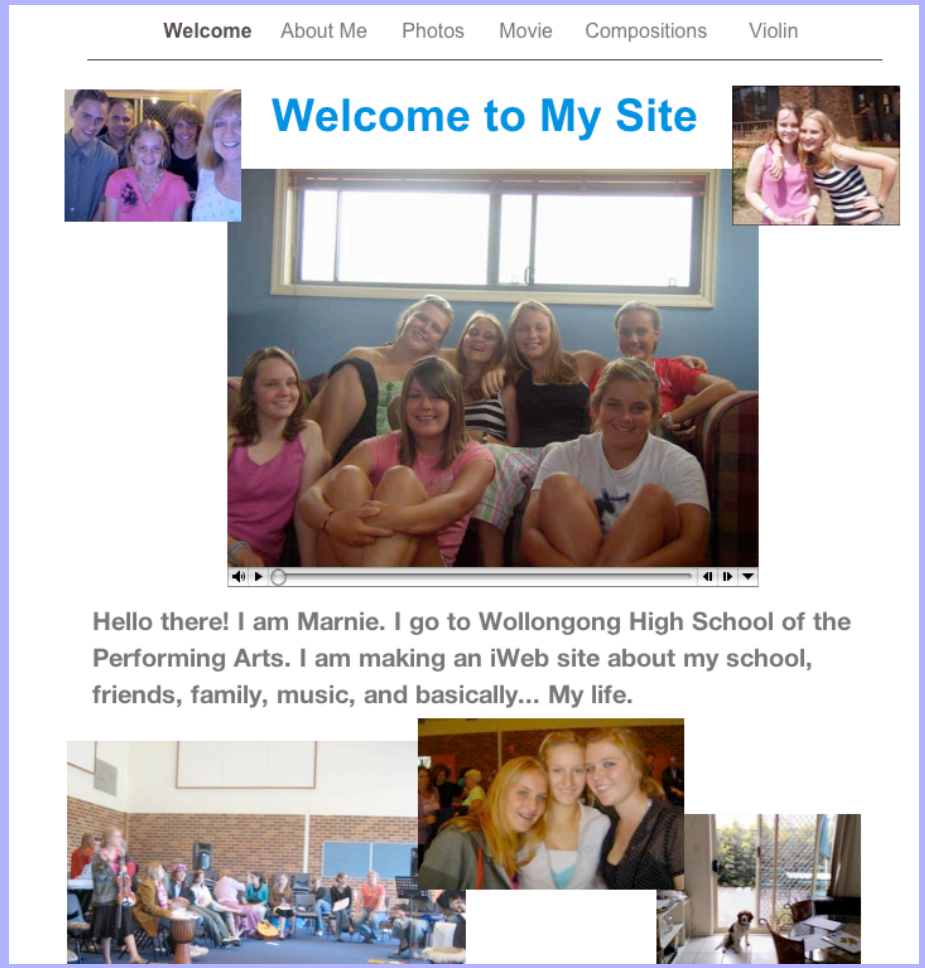
Upper primary, secondary

Subject area

Multi-disciplinary

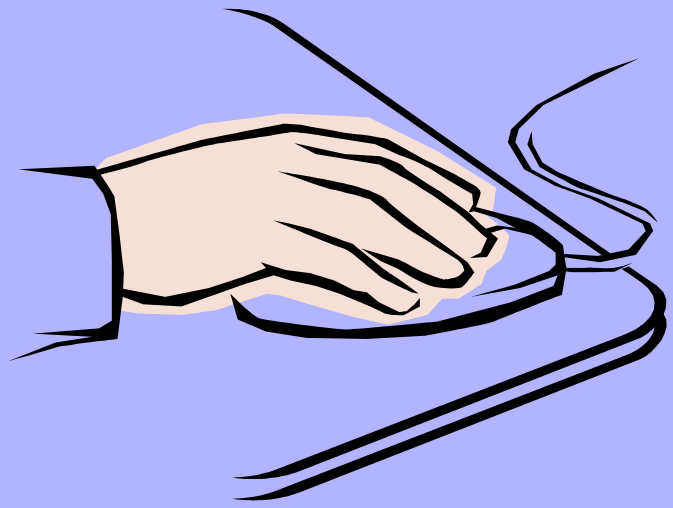
Authentic assessment

- Student web portfolio
- Web space for uploading a range of products such as:
  - Video
  - Sounds
  - Writing
  - Images



Role of technologies in these examples

- As rationale and context
- For information
- For scaffolding
- As cognitive tools



Technology in the hands of the student (rather than the teacher)!

David Jonassen:

'Students cannot use [cognitive] tools without thinking deeply about the content that they are learning,
and second, if they choose to use these tools to help them learn, the tools will facilitate the learning process'

Checklist for design

- ☑ Authentic context
- ☑ Authentic activity
- ☑ Expert performances
- ☑ Multiple perspectives
- ☑ Collaboration
- ☑ Reflection
- ☑ Articulation
- ☑ Coaching and scaffolding
- ☑ Authentic assessment

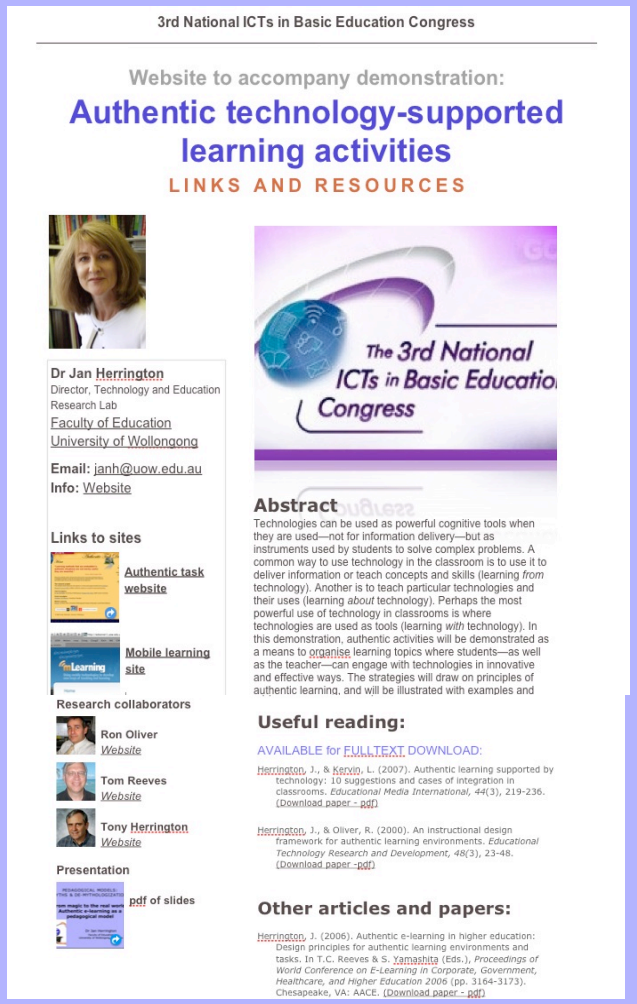
Using technology as cognitive tools

Thank you!

Downloadable papers, links to sites and resources

www.uow.edu.au/~janh/cebu/

With thanks to my co-researchers:
Ron Oliver, Tom Reeves and Tony Herrington



3rd National ICTs in Basic Education Congress

Website to accompany demonstration:

Authentic technology-supported learning activities

LINKS AND RESOURCES

Dr Jan Herrington
Director, Technology and Education Research Lab
Faculty of Education
University of Wollongong

Email: janh@uow.edu.au
Info: Website

Links to sites

Authentic task website

Mobile learning site

Research collaborators

Ron Oliver
Website

Tom Reeves
Website

Tony Herrington
Website

Presentation

pdf of slides

The 3rd National ICTs in Basic Education Congress

Abstract

Technologies can be used as powerful cognitive tools when they are used—not for information delivery—but as instruments used by students to solve complex problems. A common way to use technology in the classroom is to use it to deliver information or teach concepts and skills (learning *from* technology). Another is to teach particular technologies and their uses (learning *about* technology). Perhaps the most powerful use of technology in classrooms is where technologies are used as tools (learning *with* technology). In this demonstration, authentic activities will be demonstrated as a means to organise learning topics where students—as well as the teacher—can engage with technologies in innovative and effective ways. The strategies will draw on principles of authentic learning, and will be illustrated with examples and

Useful reading:

AVAILABLE for FULL TEXT DOWNLOAD:

Herrington, J., & Kervin, L. (2007). Authentic learning supported by technology: 10 suggestions and cases of integration in classrooms. *Educational Media International, 44*(3), 219-236. (Download paper - pdf)

Herrington, J., & Oliver, R. (2000). An instructional design framework for authentic learning environments. *Educational Technology Research and Development, 48*(3), 23-48. (Download paper -pdf)

Other articles and papers:

Herrington, J. (2006). Authentic e-learning in higher education: Design principles for authentic learning environments and tasks. In T.C. Reeves & S. Yamashita (Eds.), *Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2006* (pp. 3164-3173). Chesapeake, VA: AACE. (Download paper - pdf)